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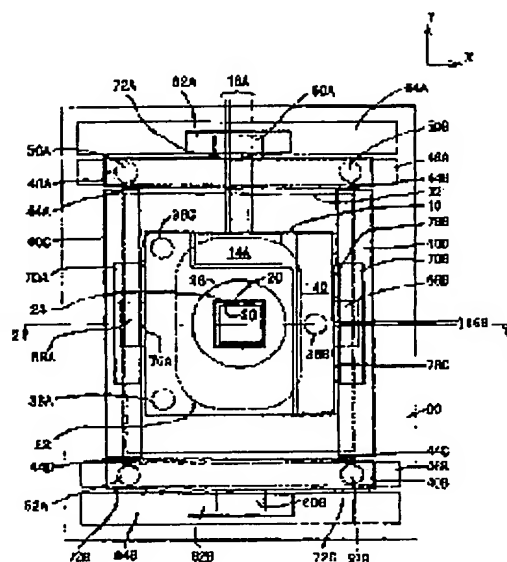
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(54) STAGE MECHANISM AND ITS OPERATING METHOD

(57)Abstract:

PURPOSE: To suppress the twisting motion of a stage and to prevent the frequency response characteristic of the stage motion from decreasing by surrounding a traveling stage from a side, allowing opposing window frame members to contact the stage so that they can be slid along with the stage, and providing a plurality of guides for supporting another opposing window frame member so that each can be slid.

CONSTITUTION: A stage 10 floats on air bearings 36A, 36B, and 36C at the upper portion of a flat upper surface of a base part structure 32 in operation state. The sides of the stage 10 are surrounded by a window frame which is a square structure body consisting of an upper window frame part 40A, a bottom part frame member 40B, a left side window frame member 40C, and a right side window frame member 40D. The window frame member 40A moves while it is supported on a fixing guide member 46A and the window frame member 40B moves while it is supported on a fixing guide member 46B. A motor coil 68A for moving the stage 10 moves in a magnetic track 70A mounted to the window frame member 40C and a motor coil 68B moves in a magnetic track 70B mounted to the window frame member 40D.



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[Detailed description]

[0001]

[The technical field to which invention belongs] About a precision movement stage, specifically, this invention is used for photolithography and relates to the stage suitable for the use for supporting a reticle especially.

[0002]

[Prior art] Especially photolithography is the field of the common knowledge used for a semiconductor manufacture. In photolithography equipment, a stage (X-Y kinematic device) supports a reticle (namely, mask), and another stage supports a semiconductor wafer, i.e., the piece of a manipulation processed. Occasionally, a single stage may be installed in a wafer or a mask.

[0003] Such a stage is indispensable to precision movement to the X-axis and Y shaft orientation, and is performed for vertical (Z-axis) adjustment of a certain very small movement. Generally the reticle stage by which a reticle is scanned within a scanning aligner is used, smooth and precise scanning movement is performed and the exact sort to the wafer of a reticle is ensured there by controlling right-angled very small displacement movement and the amount (rotation) of parvus yaws on X-Yth page to a scanning direction.

[0004]

[Object of the Invention] Conventionally, in order that such an X-Y stage might reduce a cost, it was simple in comparison and it was desirable to have been able to make from the component which can come to hand in a commercial scene, and to have maintained a desired precision. Furthermore, on many conventional technical stages, it has the guide structure arranged directly in the bottom of the stage itself. However, since it is indispensable to direct to the projection lens with which a beam of light passes along a reticle and the stage itself, and the reticle was prepared caudad, to a reticle stage, it is not desirable. Therefore, since the stage itself must form the central, quite large path because of a beam of light, the stage which is not directly equipped with the guide is required for the bottom of the stage itself.

[0005] A stage does not drive the stage of the conventional technique of moreover [many] through the center of gravity, but it is twisted desirably, and especially, this generates torsion movement on a stage and falls the frequency response nature of stage movement. this invention aims at offering the stage improved for solving such a trouble. Especially this invention is suitable for the reticle stage.

[0006]

[The means for solving a technical problem] In order to attain the above-mentioned purpose, invention (the 1st invention) of claim 1 publication The base which forms main sides in the stage device which can be exercised precise, The window frame which the aforementioned stage is surrounded from the side by the stage which has been arranged in the main sides of a base, and which can be exercised, and the 1st, the 2nd, the 3rd, and 4th window frame components, and the 1st which faces, and 2nd window frame components touch possible [the aforementioned stage and ****], It considered as the configuration which has the 1st and 2nd guides which support respectively the above 3rd and the 4th window frame component which face possible [****].

[0007] The 1st and 2nd window frame components considered the window frame [in the 1st invention in invention of claim 2 publication] as the configuration which connects with the 3rd and 4th window frame components from the link component respectively. The link component in the 1st invention has two or more ****s, and invention of claim 3 publication considered it as the configuration in which two or more of these ****s were prepared in X configuration. Invention (the 4th invention) of claim 4 publication has further two or more fluid bearings in the stage device of the 1st invention, and this fluid bearing was taken as the configuration prepared so that the aforementioned base may be met at the aforementioned stage bottom.

[0008] In the stage device of the 1st and 4 invention, further, invention of claim 5 publication is prepared in each of the 3rd and 4th window frame components, and was taken as the configuration which has at least two or more fluid bearings which meet each of the 1st and the 2nd guide. Invention (the 6th invention) of claim 6 publication prepared the 1st drive means in each of the 3 and 4th window frame components further in the stage device of the 1st invention, and this 1st drive means was considered as the configuration which drives a window frame to the 1st and the 2nd guide.

[0009] In the stage device of the 6th invention, further, invention of claim 7 publication is prepared in a base, and was taken as the configuration which has the 2nd drive means which has two incomes with each of the 1st drive means. Invention of claim 8 publication was further taken as the configuration which has the 3rd drive means in the side which meets the aforementioned stage at each of the 1st and 2nd window frame component in the stage device of the 1st invention.

[0010] This support base considered the support base where invention of claim 9 publication supports the 1st and 2nd guides, the 3rd, and 4th window frame components further in the stage device of the 1st invention as the configuration currently supported independently of the base. In the method of operation of operating the stage where invention of claim 10 publication can perform precision movement in the two right-angled orientation Arrange a stage to a base and a stage is surrounded from the side by the frame

which touches possible [a stage and ****]. It considered as the technique of operation characterized by including the phase of driving a stage in the 1st orientation of two right-angled orientation to a base, and driving a stage in the 2nd orientation of two right-angled orientation to a frame.

[0011] In the frame structure which invention of claim 11 publication can transform and by which hinge installation was carried out The four aforementioned rigid-body frame components which form the acute-angle structure by which is used as four rigid frame components arranged at four square shapes, and each frame component adjoins the acute-angle structure with the same contiguity frame component, and is put on it of the edge, besides near, It is two or more link components which have connected the two adjoining acute-angle structures each, and considered as the configuration containing the link component prepared in X configuration.

[0012] The link section considered invention of claim 12 publication as the configuration currently manufactured by the stainless steel thinner than 0.05 inches. That is, the precision movement stage device of this invention has the stage which exercises X-Yth page top on a flat base itself. The stage is having the side surrounded by four frames (henceforth a window frame component) formed in the shape of an aperture. This window frame component forms the structure (henceforth a window frame) of four square shapes attached the angle or near [its] the angle. That is, the window frame is formed when four window frame components connect. The link component which connects is link section which is the hinge (ginglymus) special type which performs movement which four square shapes deform slightly. That is, it enables a square or a rectangle to deform into the four sides type of parallel by this link component. In one format, these link sections are thin stainless-steel ****s attached in "X" configuration, and perform hinge movement of the grade of a request of between two window frame components which adjoined and connected. (It mentions later for details using drawing 6 .)

A window frame is driven with the motor coil attached in two components of the window frame component which has two incomes with the magnetic track fixed on the base which face, and runs against the guide which set and left two spacings and which was fixed in parallel, for example, moves a base top to X shaft orientations.

[0013] A window frame actually follows movement of a stage and sends a magnetic track required for movement of a stage in the orientation of Y. (Although X and Y-axis are quoted, this is only for explaining the azimuth about this view, and not being restrained as what is limited will be understood here.)

Stage movement of orientation (Y shaft orientations) right-angled in the movement orientation of a window frame is performed by the stage moved along with other components of a window frame. A stage is driven relatively [window frame] with the motor coil which collaborates with the magnetic track which was attached in the stage and attached in two connected components of a window frame.

[0014] In order to make a friction into the minimum, the stage is supported by the base by the air bearing attached in the stage bottom, or other fluid bearings. Similarly, a fluid bearing supports a window frame component to those fixed guides. Furthermore, a fluid bearing is applied and loaded in the guide which had the window frame component fixed (loading), and is applying and loading the stage in a window frame. In order to enable slight yaw movement (rotation in the X-Y flat surface of the circumference of the Z-axis), these loading bearings are attached by the spring. The stage itself forms the central path. The reticle is put on the chuck attached on the stage. The beam of light from the source of a lighting generally arranged above a reticle progresses to the projection lens which goes to the central path which passes along a reticle, and has been arranged.

[0015] Although the stage of this invention is not restrained by supporting a reticle, can be used also as a wafer stage and is not actually limited to the intended use of phot lithography by suitable correction, generally it is suitable for the precise stage. This is directly transmitted to a ground level with the supporting-structure field with which it became independent independently although the reaction force with the drive motor which carries out the window frame drive of other characteristic features by this invention with a stage was not sent to the housing of phot lithography equipment. Therefore, the reaction force generated by movement of a stage does not cause movement which is not desirable to other elements of a projection lens or a phot lithography machine.

[0016] Thus, it is prevented by insulating the reaction force of a stage from a projection lens or the related structure that such reaction force vibrates a projection lens or the related structure. These structures are equipped with the interferometer equipment for determining the exact position of the stage of an X-Y flat surface, and a wafer stage. From other elements of a phot lithography machine, a reticle-stage device base material sets a spacing, separates, is supported independently, and is elongated to the ground level.

[0017] The reaction force generated from the operation of four motor coils which moves a stage and the guide of a window frame is transmitted through the center of gravity of a stage, and, thereby, this advantage is that moment of force (namely, torque) is reduced. The controller which controls the power to four drive-motor coils takes balance of driving force by the differential driving method, taking the relative position of a stage and a window frame into consideration.

[0018]

[Gestalt of implementation of invention] Drawing 1 shows the plan of the stage device by this invention. Moreover, please refer to application and original No.NPI0500 on simultaneous connection same possession and U.S. patent-application [of invention], No.08/221,375, and name "equipped with insulated reaction stage guide loess stage" April 1, 1994. This application patent is indicated by reference at this specification, shows the related technique of supporting the element of a stage device, and has insulated reaction force from a projection lens and photolithography equipment.

5 [0019] A stage 10 (plan) is the structure of four square shapes manufactured by rigid material (for example, steel, aluminum, or a ceramic). The interaction of the two interferometer mirrors 14A and 14B arranged on the stage 10 is usually carried out to a passage with each laser beams 16A and 16B. Generally, laser beam 16A is 2 sets of laser beams, laser beam 16B is the laser beam of a couple, and these laser beams are related with three distance measured value. The fraction 22 which came floating is formed in the stage 10 bottom (although shown by the dotted line, on a drawing, it is not visible). That is, it is formed so that a stage 10 may cover the upper part of the projection lens 92 (refer to drawing 1).

10 [0020] A reticle 24 is arranged on a stage 10 and held by the conventional reticle vacuum column 26 formed in the top of the chuck plate 28. The stage 10 also forms the central opening 30 (path) in the bottom of a reticle 24. by the central opening 30, incidence of the beam of light (others -- a beam of light) which penetrated the reticle 24 can be carried out to the projection lens 29 underneath the reticle as explained in detail henceforth (It will be understood that reticle 24 the very thing is not a part of stage device.) Opening 30 is unnecessary if the stage device of this invention is used for things other than a reticle stage, i.e., wafer support, in addition to this.

15 [0021] The stage 10 is supported on the base structure 32 of four ordinary square shapes which have smooth and flat upper front faces, such as the rigid field, steel, or aluminum. the edge (drawing 1) of right and left of the base structure 32 is shown by the dotted line, and is established in the top by other structures (it is explained later -- as) of this drawing At operating state,; to which the stage 10 does not touch the base structure directly physically, instead the stage 10 are supported by the conventional bearings, such as a gas bearing, in this example. In the one embodiment, three air bearings 36A, 36B, and 36C of the type which can come to hand in a commercial scene are used.

20 [0022] In other air bearing / vacuum structures, it dissociates physically with a part for an air bearing, and the vacuum fraction adjoins. It is sent through the capillary of the flux of the spool with ordinary vacuum and compressed air, and the pipe line of an internal capillary (since it is brief, not shown in a drawing). Thereby, in operating state, a stage 10 is 3 micrometers from the upper part abbreviation 1 of the flat top of the base structure 32, and floats the air bearingsA [36],B [36], and 36C top. It will be understood the bearing (for example, combination type of an air bearing / MAG) of other types, instead that it can be used.

25 [0023] The stage 10 is having the side surrounded by the window frame which is the structure of four square shapes which consist of four window frame components. Four window frame components shown in drawing 1 are up window frame component 40A, pars-basilaris-occipitalis window frame component 40B, left-hand side window frame component 40C, and right-hand side window frame component 40D in a drawing. These four window frame components 40A-40D are manufactured with the material which has the high degrees (rigidity/density ratio) of peculiar rigidity, such as aluminum or synthetic material. These four window frame components 40A-40D are attached by the hinge structure (link component) together. That is, it has connected with one through a link component. Non-fixing movement of four window frame components with the circumference of the Z-axis called by this yaw movement indicated to be mutual [in an X-Y flat surface] to the drawing is performed. This hinge is explained in detail later. Each hinges 44A, 44B, 44C, and 44D are one or more metal link sections which make deflection with a slight window frame possible.

30 [0024] a window frame exercises for the X-axis which was supported by the level surface of the fixed guides 46A and 46B, and was supported by the perpendicular of the fixed guides 64A and 64B (drawing 1 -- setting -- right and left) (The guides 46A and 64A to which each class was fixed, and 46B and 64B are the guides to which single L configuration was fixed, for example.) or it is understood that the guide to which other configurations were fixed can also be used -- I will come out Two air bearings 50A and 50B attach and get down to window frame component 40A, and window frame component 40A supports and exercises on the fixed guide component 46A currently supported by this air bearing. Similarly, the air bearings 52A and 52B are attached in window frame component 40B, and, thereby, window frame component 40B supports and exercises on the fixed guide component 46B currently supported. The air bearings 50A, 50B, 52A, and 52B are similar with air bearing 36A etc.

35 [0025] A window frame is driven by the conventional linear motor along with the X-axis of the fixed guides 46A and 46B, and 64A and 64B. A linear motor has motor coil 60A attached in window frame component 40A. motor coil 60A moves magnetic-track 62A arranged (or this -- meeting) to fixed guide 64A Similarly, motor coil 60B attached in window frame component 40B moves magnetic-track 62B arranged at fixed guide 64B. A motor coil and the truck combination field are parts No.LM-310 of ***** of the Texas web ***** Trucks 62A and 62B are the permanent magnets of the masses

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fixed to one, respectively. Although the electrical wire connected to the motor coil is not shown, it is an ordinary electrical wire. The linear motor of other types can also be used instead. Since the position of the motor coil of each motor and a magnetic track can be made reverse, a magnetic track can be arranged on a stage 10 and a magnetic track can also arrange a corresponding motor coil to a window frame component, for example, although there is a handicap to which a performance falls.

[0026] Similarly, a stage 10 exercises along with the Y-axis of drawing 1 with the motor coils 68A and 68B attached in the edge of right and left of a stage 10, respectively. Motor coil 68A moves magnetic-track 70A attached in window frame component 40C. Motor coil 68B moves magnetic-track 70B attached in window frame component 40D.

[0027] The air bearings 72A, 72B, and 72C are shown also in drawing 1. Air bearing 72A is arranged at window frame component 40A, and makes the minimum the friction between window frame component 40A and its fixed guide 64A. The motion in alignment with yaw movement (rotation of X-Y page of the circumference of the Z-axis) and the Z-axis of a constant rate becomes possible by using single air bearing 72A in an end, and two air bearings 72B and 72C in the other end which face. in this case, the gimbal which is attached by the gimbal (cross-joint *****) or has generally been arranged at the link section in order that air bearing 72A may restrain the amount of the irregular train between guide 64A fixed with window frame component 40A -- free ** -- it is attached dynamically

[0028] The loading effect held in the guides 64A and 64B which had the window frame guide fixed, and a suitable relation can be given by facing bearings 72B and 72C and using air bearing 72A. Similarly, air bearing 76A applies weight to the air bearings 76B and 76C which were altogether attached in the side face of a stage 10 and which face, and maintains pertinently the position of the stage 10 to the window frame components 40B and 40D which face. In this case, if it says repeatedly, one air bearings, such as 76A, are attached by the gimbal, or are attached for hanging 10 characters by the gimbal (spring) of the link section so that the irregular train of the limited amount may be given. The air bearings 72A, 72B, and 72C, and 76A, 76B and 76C are the air bearings of the conventional type.

[0029] The outside structure 80 of drawing 1 is the base supporting-structure field over the guides 46A, 46B, 64A, and 64B and the window frame components 40A, 40B, 40C, and 40D to which the stage device was fixed. Thus, since the base material placed is divided, the reaction force to the base supporting-structure field 80 is not transmitted to the stage base structure 32. The base supporting-structure field 80 is supported to the floor of a footing, i.e., surface of the earth, or a building with the support cylinder of itself, or other ordinary support elements (not shown in this drawing). The suitable example of the supporting-structure field is indicated by drawing 1 of quoted U.S. patent-application No.08/221,375, and 1B and 1C. The independent supporting-structure field of this fraction of a stage device is equipped with the above-mentioned advantage of separating the reaction force of the drive motor of a reticle-stage device from the frame which supports other elements of photolithography equipment, dissociating from the optical element which has the projection lens 92 especially, and a wafer stage, and transmitting, and, thereby, makes the minimum the oscillating force to the projection lens by movement of a reticle stage. This is explained later still in detail.

[0030] It near-passes along this driving force of a stage device at the center of gravity of a stage device as much as possible, and it is applied to it. Like understanding, the center of gravity of a stage device is moved by the stage 10. Therefore, it joins together and the stage 10 and the window frame guide form the sharing center of gravity. The motor coils 60A and 60B control the force applied with each motor coils 60A and 60B, taking the position of a window frame guide into consideration, and they maintain it as the effective force is applied to the center of gravity. The differential drive controller of the motor coils 68A and 68B conventional type [another] controls the force applied with each motor coils 68A and 68B, taking the position of a stage 10 into consideration, and it maintains it as the effective force is applied to the center of gravity. It will be understood that the differential drive of the motor coils 60A and 60B includes large differential titubation since a stage 10 exercises a large domain. In contrast with this, since a window frame guide does not change at all, the differential drive of the motor coils 68A and 68B includes parvus differential titubation far, and gives the balance effect. It makes it easy especially for the reaction force generated by movement of a reticle-stage device to be maintained by the single flat surface, therefore to separate these force from other fractions of photolithography equipment by [advantageous] using a window frame guide.

[0031] Drawing 2 is a cross section which passes along the line 2-2 of drawing 1. The structure shown in drawing 2 also in drawing 1 has the same reference number, and is not explained here. The illuminator 90 is shown in drawing 2, it is an ordinary element, this is not shown in detail here, and since it is brief, it is omitted by drawing 1. The upper part (cylinder) 92 of a projection lens is not shown in detail by drawing 2, either. Although not indicated in drawing 2 as the lower part of the projection lens 92, and other elements of photolithography equipment, illustration explanation is given henceforth.

[0032] The supporting-structure field 94 of the projection lens 92 is shown also in drawing 2. Like understanding, by few voids 96, the structures 94 are all parts and are separated from the base supporting-

structure field 80 of a reticle-stage device. This void 96 insulates with the projection lens 92 vibration generated by movement of a reticle-stage device from the base material 94. Although a stage 10 is not the flat structure, it forms the fraction 22 which holds the upper part of a lens 92 and to which the bottom came floating in this embodiment, as shown in drawing 2 . Magnetic-track 70A is attached in the crowning of window frame guide 40B, and magnetic-track 70B is similarly attached in the crowning of window frame component 40D which faces.

[0033] Drawing 3 A and 3B are the enlarged views of the fraction of drawing 2 of the same reference number. Drawing 3 A is on the left-hand side of drawing 2 , and drawing 3 B is on the right-hand side of drawing 2 . The spring fixture 78 of air bearing 76A is shown in drawing 3 A. Air bearing 78A is attached in the side face of a stage 10 with the spring, and, thereby, the yaw (rotation in the X-Y flat surface of the circumference of the Z-axis) of a constant rate and limited movement in alignment with the Z-axis are possible. Gimbal installation can be used by the ability adding to this instead of a spring 78. The irregular train of the amount to which it was limited between a stage 10 and the window frame components 40C and 40D (not shown in drawing 3 A) by a spring or gimbal installation is possible.

[0034] Although drawing 4 is the plan of the phot lithography equipment which has drawing 1 and the stage device of 2, this has the support base structure 100 which supports further the phot lithography equipment which has the frame 94 other than the element shown in drawing 1 except for a reticle-stage device. (Since the structure shown in drawing 1 is brief, all are not displayed on drawing 4 .) The base structure 100 is supporting four perpendicular support cylinders 102A, 102B, 102C, and 102D connected to the structure 94 by the bracket structures 106A, 106B, 106C, and 106D, respectively. The size of the base structure 100 is quite large, and is about 3m downward from a top in the one embodiment. 102 A each, and 102B, 102C and 102D having servo mechanism (not shown) ordinary inside for leveling will be understanding. The base materials 108 and 110 of each laser interferometers (beam splitter etc.) 112A, 112B, and 112C are also shown in drawing 4 . It will be understood well that drawing 4 refers to the cross section of drawing 5 which passes along the profile line 5-5 of drawing 4 .

[0035] in drawing 4 and 5, all the sizes of the supporting-structure field 94 should pass an ordinary footing (not shown) -- it sees with the support cylinders 102A and 102C placed on the base structure in contact with the ground The reticle-stage base supporting-structure field 80 is shown only in drawing 4 (since it is brief), it consists of the cylinders 114A, 114B, 114C, and 114D of four couple Mino which has the connected bracket structures 116A, 116B, 116C, and 116D similarly, and this is elongating the cylinder from the height of the base supporting-structure field 80 to the base structure 100.

[0036] The supporting-structure field 122,124 connected with the wafer 120 is shown in the lower part of drawing 5 . The magnetic track usually arranged at the fixed stage guide arranged in the base, the stage itself, and the base and the fixed stage guide and a magnetic track are equipped with the element of the wafer stage 120, and it consists of the motor coil connected to the stage itself (not shown in a drawing). The laser beam from the laser 124 attached in the base material 126 positions a lens 92 and the stage itself with an interferometer.

[0037] Drawing 6 A is a plan (it corresponds to drawing 1), and shows the detail, one, for example, 44C, of the link section structure by which the hinge was carried out in the window frame guide. Each of hinges 44A, 44B, 44C, and 44D is the same. These link section hinges do not need lubrication, a hysteresis is not presented (unless the link section curves from the mechanical tolerance), and it does not have mechanical "ramp", but has further an advantage more than the mechanical type hinge referred to as that a cost does not start a manufacture.

[0038] Each link section of each is for example, 1 / 4 degree-of-hardness 302 stainless steel, and thickness about 20 mills (0.02 inches), and can be equal to the 0.5 maximum bending. The width of face of each link section is not strict, and general width of face is 0.5 inches. Two, three, or the four link sections are used for each hinges 44A, 44B, 44C, and 44D of drawing 1 . The number of the link sections used for each hinge is essentially determined by the usable grade of a void, i.e., the height of a window frame component. Each four link sections 130A, 130B, 130C, and 130D shown in drawing 6 A (to and 90 degrees rotation diagram of drawing 6 B) are fixed to the window frame component (window frame components 40A and 40B of drawing 6 A and 6B) which adjoined by clamps 136A, 136B, 136C, and 136D with the ordinary screw. The aforementioned screw passes along each hole and clamp of the link sections 130A, 130B, 130C, and 130D, and is fixed to the hole with a screw thread where the window frame components 40A and 40B correspond.

[0039] Unlike them of drawing 1 for a while, please observe the window frame components 40B and 40D of drawing 6 A and 6B that the metal link sections 130A, 130B, 130C, and 130D are attached there about the structure of the acute angle (triangle) in the edge of the window frame components 40B and 40D. In the embodiment of drawing 1 , although this acute-angle structure is omitted, screw installation of the link section is easy by those presence.

[0040] In other embodiments, although the hinge setting of the frame guide is not carried out, it is the rigid structure. In order to hold this rigidity and to prevent combination, one of bearings 72C or 72B is removed, and the remaining bearing moves to the center of gravity, and is attached without the spring in the gimbal.

Other bearings (removing the bearing attached in the stage 10) are also attached by the gimbal.

[0041] Although this indication is proved, it does not limit, and in the light of this indication, deformation of further others is clear to the person concerned who became skilled in this technique, and does not deviate from an appending claim.

5 [0042]

[Effect of the invention] As mentioned above, the guide which interrupts a beam of light (exposure light which projects a reticle) and which is not things is not prepared on a stage, and a stage can be driven, it is not necessary to prepare big opening in a stage, and, according to the stage device and its technique of operation of this invention, a stage can be driven.

10 [0043] Furthermore, by this invention, occurrence of torsion movement of a stage can be prevented and the frequency response nature of stage movement can be improved.

[Claim]

15 [Claim 1] The base which forms main sides in the stage device which can be exercised precise, The window frame which the aforementioned stage is surrounded from the side by the stage which has been arranged in the main sides of a base, and which can be exercised, and the 1st, the 2nd, the 3rd, and 4th window frame components, and the 1st which faces, and 2nd window frame components touch possible [the aforementioned stage and ****], The stage device characterized by having the 1st and 2nd guides which support respectively the above 3rd and the 4th window frame component which face possible [****].

20 [Claim 2] The aforementioned window frame is the stage device of the claim 1 publication characterized by connecting respectively the above 1st and the 2nd window frame component with the above 3rd and the 4th window frame component from the link component.

25 [Claim 3] The aforementioned link component is the stage device of the claim 2 publication characterized by having two or more ****s and preparing two or more of these ****s in X configuration.

[Claim 4] It is the stage device which has further two or more fluid bearings in the stage device of claim 1 publication, and is characterized by preparing this fluid bearing so that the aforementioned base may be met at the aforementioned stage bottom.

30 [Claim 5] The stage device characterized by having at least two or more fluid bearings which are prepared in each of the above 3rd and the 4th window frame component, and meet each of the above 1st and the 2nd guide further in the claim 1 and a stage device given in four.

[Claim 6] the stage device of claim 1 publication -- setting -- further -- each of the above 3 and the 4th window frame component -- the 1st drive means -- preparing -- this -- the stage device characterized by the 1st drive means driving the aforementioned window frame to the above 1st and the 2nd guide

35 [Claim 7] The stage device characterized by having the 2nd drive means which is prepared in the aforementioned base and has two incomes with each of the drive means of the above 1st further in the stage device of claim 6 publication.

40 [Claim 8] The stage device further characterized by having the 3rd drive means in the side which meets the aforementioned stage at each of the above 1st and the 2nd window frame component in the stage device of claim 1 publication.

[Claim 9] It is the stage device further characterized by supporting this support base independently of the aforementioned base in the support base which supports the above 1st, the 2nd guide and the above 3rd, and the 4th window frame component in the stage device of claim 1 publication.

45 [Claim 10] Technique of operation characterized by including the phase of arranging a stage to a base, surrounding a stage from the side by the frame which touches possible [a stage and ****], driving a stage in the 1st orientation of two right-angled orientation to the aforementioned base in the method of operation of operating the stage which can perform precision movement in the two right-angled orientation, and driving a stage in the 2nd orientation of two right-angled orientation to the aforementioned frame.

50 [Claim 11] It is made four rigid frame components which can deform and which have been arranged in the frame structure by which hinge installation was carried out at four square shapes. The four aforementioned rigid-body frame components which form the acute-angle structure by which each frame component adjoins the acute-angle structure with the same contiguity frame component, and is put on it of the edge, besides near, The aforementioned frame structure characterized by including the link component which are two or more link components which have connected the two adjoining acute-angle structures each, and is prepared in X configuration.

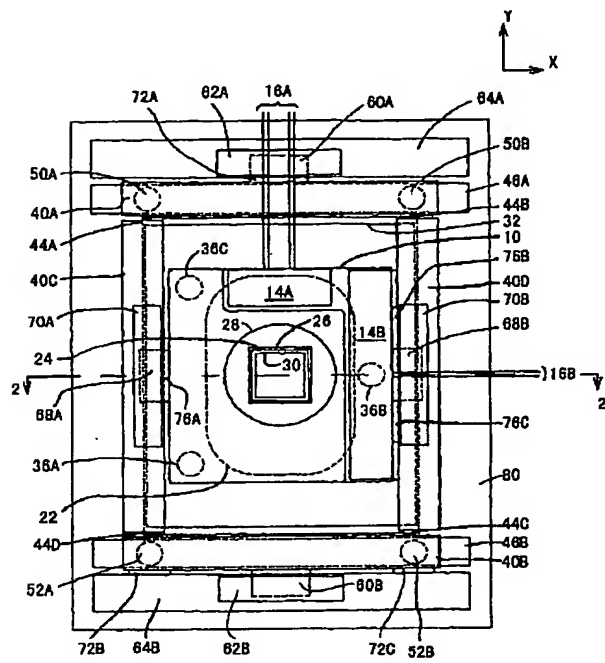
55 [Claim 12] The aforementioned link section is the frame structure of the claim 11 publication characterized by being manufactured by the stainless steel thinner than 0.05 inches.

[An easy explanation of a drawing]

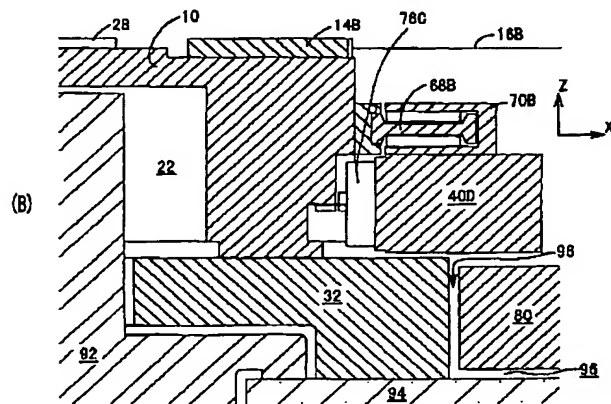
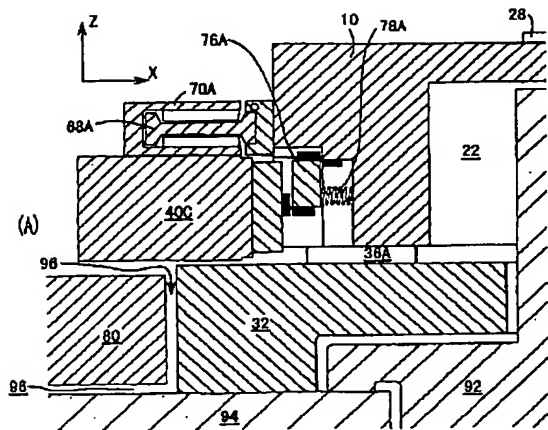
60 [Drawing 1] It is the plan of the stage guided by ** and the window frame.

[Drawing 2] It is the side elevation of **, a guide, a stage, and the related structure.

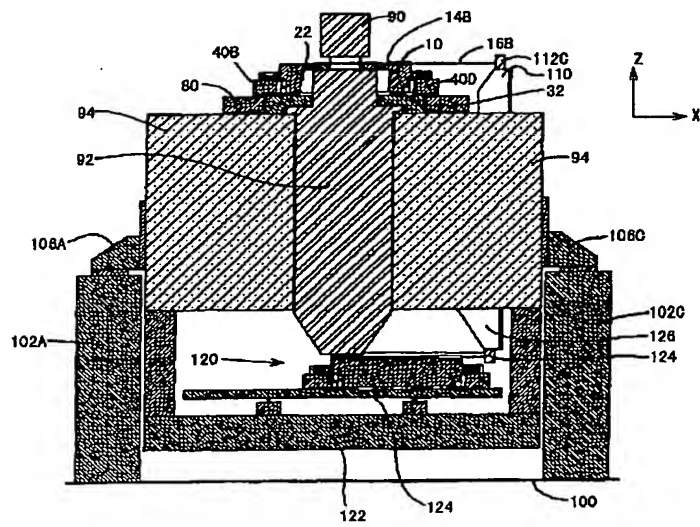
- [Drawing 3] It is the enlarged view of the fraction of the structure of ** and drawing 2 .
- [Drawing 4] It is the plan of the phot lithography equipment which requires the stage by ** and the guide.
- [Drawing 5] It is the side elevation of phot lithography equipment of ** and drawing 4 .
- [Drawing 6] It is the link section which connects ** and a window frame component.
- 5 [An explanation of main signs]
- 10 Stage
- 14 Interference Mirror
- 24 Reticle
- 26 Reticle Vacuum Column
- 10 28 Chuck Plate
- 32 Base Structure
- 36 Air Bearing
- 40 Window Frame Component
- 44 Link Component
- 15 46 Guide
- 50 Air Bearing
- 52 Air Bearing
- 60 Motor Coil
- 64 Guide
- 20 68 Motor Coil
- 70 Magnetic Track
- 80 Outside Structure
- 90 Illuminator
- 92 Projection Lens
- 25 16

Drawing selection 

[Translation done.]

Drawing selection 

[Translation done.]

Drawing selection 

[Translation done.]

Drawing selection drawing 6 ▼

